

Claims

What is claimed is:

1. A method for controlling congestion at an output from a node in a data communications network wherein data is transmitted in packets, each packet having a discardability characteristic, said method comprising the steps of:
 - establishing a set of available, alternative discard strategies for packets having different discardability characteristics;
 - maintaining a profile of packets recently received at the output, the profile reflecting the discardability characteristics of said packets;
 - monitoring the output to detect the onset of congestion;
 - upon detection of congestion, using the profile to select an initial discard strategy; and
 - initiating the selected initial discard strategy.
2. A method as set forth in claim 1 further including the steps of:
 - continuing to monitor the degree of congestion at the output; and
 - selecting and initiating one or more subsequent discard strategies as the degree of congestion changes.

1 3. A method as set forth in claim 2 further including the step of terminating the
2 currently initiated discard strategy in response to a determination that congestion
3 no longer exists at the output.

1 4. A method as set forth either in claim 2 or claim 3 wherein each successively
2 initiated discard strategy is intended to result in the discard of fewer packets than
3 the previously initiated discard strategy.

1 5. A method as set forth in claim 4 wherein the step of maintaining a profile
2 further comprises the steps of:

3 maintaining a count of the number of packets actually stored in an output
4 buffer at the output;

5 maintaining counts of the number of said packets which would have been
6 stored in the output buffer if different discard strategies in a set of available
7 discard strategies had been in effect during the receipt of the packets actually
8 stored in the output buffer.

1 6. A method as set forth in claim 5 wherein the step of selecting an initial discard
2 strategy further comprises the step of comparing each of said maintained counts
3 to a predetermined threshold and selecting the discard strategy associated with
4 the count closest to but greater than the predetermined threshold.

1 7. A method as set forth in claim 6 wherein the step of selecting and initiating
2 one or more subsequent discard strategies further comprises the steps of:

3 monitoring the count associated with the currently initiated discard

4 strategy; and

5 selecting a different discard strategy when the monitored count falls below
6 the predetermined threshold.

1 8. A system for controlling congestion at an output buffer in a node in a packet
2 data communications network, said system comprising:

3 a first counter for maintaining a count n of the number of packets actually
4 stored in the output buffer;

5 a plurality of additional counters, each additional counter being associated
6 with a different predetermined discard strategy and maintaining a count of the
7 number of packets which would have been stored in the output buffer had the
8 associated discard strategy been in effect during receipt of the last n packets;

9 discard initiation logic for generating a congestion-detected signal when
10 the count n exceeds a predetermined high threshold;

11 discard strategy selection logic for selecting and initiating one or more
12 sequential discard strategies as a function of the counts maintained in said
13 plurality of additional counters; and

14 discard termination logic for terminating discarding of packets when the
15 count n falls below a predetermined low threshold.

1 9. A system for controlling congestion as set forth in claim 8 wherein said
2 discard strategy logic further comprises:

3 compare logic for comparing the count in each of said additional counters
4 to a predetermined intermediate threshold; and

5 selection logic for initially selecting the discard strategy associated with
6 the additional counter having a counter closest to and greater than the
7 predetermined intermediate threshold.

1 10. A system for controlling congestion as set forth in claim 9 wherein said
2 discard strategy logic further comprises logic for detecting when the count
3 associated with the currently selected discard strategy has fallen below the
4 predetermined intermediate threshold and for selecting a different discard
5 strategy to be initiated.

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